New England Deaconess Hospital

pulse

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'Dynamic treatment' provides computerized radiation therapy

After four years of intricate testing, a computerized system for irradiating tumors is being used in the treatment of selected patients in the Joint Center for Radiation Therapy (JCRT) at the Deaconess Hospital.

The system, called "dynamic treatment" or computer-controlled radiation therapy, increases the dose of radiation to the tumor while decreasing the dose to normal tissue. Dynamic treatment, for which the JCRT has the only such computerized unit in the country, should be especially beneficial in treating patients with deep-seated tumors.

"Radiation doses given to tumor target areas are determined more by the need to avoid complications in normal tissue than by the desire to eradicate malignant cells," said Bengt Bjärngard, Ph.D., JCRT director of physics and engineering. "The challenge is to improve the radiotherapy system by using more beams and shaping them to build up the desired dose distribution."

In practice, much of this could be done with existing equipment, but at the cost of increased treatment time and the risk of errors caused by the complexity of the treatment plan. Also, in order to meet the objective of better dose distribution, the patient and/or machine would have to be moved during treatment. Accuracy would be difficult to maintain.

Since computer technology has been used to solve similar problems in other fields, the JCRT staff decided to investigate the possibility of placing a therapy machine under computer control during treatment. The concept of moving-field radiotherapy has been around since 1906, but hasn't been generally applied to computer control because of the complexity of the system and the accompanying risk of error.

Under the direction of Dr. Samuel Hellman, JRCT director and chairman of the department of radiation therapy at Harvard Medical School, the JCRT collaborated with Massachusetts Institute of Technology (MIT) and the Siemens Corporation in redesigning a linear accelerator to respond to computer directions. The program has been supported by the National Cancer Institute.

Dynamic treatment differs from conventional radiation therapy in that the

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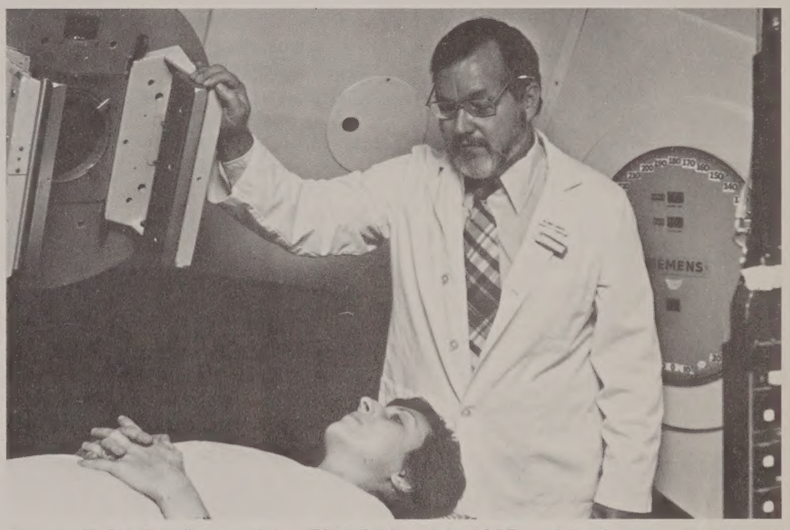

Dr. John T. Chaffey, director of the NEDH division of the JCRT, explains the dynamic treatment unit.

Professorship honors Dr. Shields Warren

A professorship honoring the life and work of Dr. Shields Warren will be established at Harvard Medical School and the New England Deaconess Hospital where Dr. Warren served from 1927 until his death on July 1, 1980. The chair will be known as the Shields Warren-Mallinckrodt Professorship of Clinical Research, and recognizes "the many contributions of Shields Warren, M.D. to science, medicine, and medical education. Each recipient of the professorship shall have an interest in and a commitment to investigation in medicine."

Mallinckrodt, Inc. and the Edward Mallinckrodt, Jr. Foundation of St. Louis have each contributed a quarter of a million dollars to the endowment which will create the chair. Harvard Medical School and the Deaconess Hospital will seek additional gifts to bring the chair to the full funding of $1 million.

Dr. Warren had many decades of association with the Mallinckrodt interests, serving as a director of the company and as president and director of the Foundation. Plans for the endowment of a professorship in his honor were known to Dr. Warren, and he had the pleasure of acknowledging this tribute from his associates just a few months before his death.

In announcing the new professorship, Dr. Daniel C. Tosteson, dean

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Rx for hay fever sufferers

From mid-August until the first killing frost in November hay fever sufferers experience the torment associated with ragweed season and many require medical attention. Thus far, the 1980 season has been particularly harsh on people with ragweed allergy, according to Dr. Albert L. Sheffer, section chief in allergy at the Deaconess Hospital.

But now, according to Dr. Sheffer, these patients need no longer quietly endure the miseries of ragweed season. Biochemical researchers are developing a wealth of promising new treatments which include antihistamine and steroid drugs and immunotherapy that offer substantial relief for hay fever sufferers.

Dr. Sheffer says that people who predictably begin sneezing every August or September may obtain relief from antihistamines sold over-the-counter at their local pharmacy. Chlorpheniramine maleate is one of the better antihistamines available without prescription.

In Dr. Sheffer's view, skin testing is most appropriate and beneficial for people who are incapacitated by recurring rhinitis during two or three periods of the year. Prior to skin testing a patient, an allergist usually prepares a complete health history detailing the allergic person's diet and work habits and factors present in his living environment and then conducts a thorough physical examination.

Skin testing requires applying suspected extracts of allergic substances directly into the skin. A battery of perhaps three to six extracts from trees, grass, ragweed, feathers, dust, mold and animal dander are injected at a time. Within 20 minutes, if the individual possesses an antibody to a particular allergen, a reaction at the in-

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NEDH PARTICIPATES IN MISSION HILL FAIR – *The Deaconess was one of 100 exhibitors at a recent community fair held at nearby Mission Hill. Mary Fraser, medical technologist, performed a number of screening tests for diabetes, and over 700 NEDH balloons were given out to children at the popular exhibit.*

Ophthalmologists caution patients seeking radial keratotomies

Vanity and convenience seem to be the primary reasons for the sudden interest in a controversial eye operation which appears to cure myopia (nearsightedness). About 1000 people in the United States have undergone the operation, called radial keratotomy, over the past four years. Published reports so far indicate a good percentage of these patients have had their vision improve enough to discard their eyeglasses or contact lenses.

So why are the vast majority of ophthalmologists in the United States skeptical about the operation? "Radial keratotomies are performed by making 16 microsurgical incisions in the cornea of the eye. The slits are placed radially on the cornea so that they extend from the central optic zone, which they do not invade. The final result resembles the spokes of a wheel," said Dr. John Sebestyen, NEDH and Joslin clinic ophthalmologist.

"Virtually the same procedure is followed on every patient regardless of the severity of his or her myopia. All eyes have individual characteristics, just as each patient reacts differently to surgery or disease. How can one formula fit all eyes?", said Dr. Sebestyen.

"Four years of informal testing is not enough time to study the possible long-term hazards of radial keratotomies. This operation could potentially harm the millions of myopic people in the United States who would be eligible for the procedure. It's inappropriate to condone or condemn a procedure without first evaluating it through animal studies and a controlled clinical trial."

Radial keratotomy was discovered accidentally in 1972 when a Russian schoolboy's eyeglasses were shattered during a fight. The glass fragments superficially slashed the boy's cornea, correcting his nearsightedness. A Russian physician, Dr. Svyatoslav Fyodorov, decided to try the technique on humans after completing animal studies. Since 1974 he and his colleagues have operated on about 4,000 Russian patients, apparently with good results although data on the patients is not readily available for evaluation by U.S. physicians.

Myopia occurs because the eyeball is too elongated, or the refractive system is too powerful for the eye, making visual images fall short of the retina (back of the eye). As a result, objects in the distance appear blurred to the nearsighted person. During radial keratotomy, the cornea – the curved, clear tissue on the surface of the eye – is flattened by the "pinwheel" incisions. Visual images are then brought into closer focus on the retina. The 15-minute operation is performed with the use of anesthetic eyedrops, and costs about $1500 per eye.

The National Eye Institute is financing a nation-wide five-year study of radial keratotomy, although some ophthalmologists think the money could be better spent on studying life-threatening diseases.

CHINESE MEDICAL DELEGATION VISITS NEDH AND JOSLIN CLINIC – *Dr. Donald M. Barnett gives visiting medical delegation from the People's Republic of China an overview of activities at the Diabetes Treatment Unit and the Joslin Clinic. Participating in the tour were (l-r): Dr. Chi Zhisheng, professor and chief, Department of Endocrinology, Capital Hospital, Beijing; Dr. Deng Quxiu, director, Bureau of Medical Treatment, Beijing; Dr. Jian Guoyan, deputy director, Department of Internal Medicine, Beijing Hospital, Beijing; Dr. Zhong Xueli, associate professor of internal medicine, Haushan Hospital, Shanghai; and Dr. Pan Xiaoren, director, Laboratory of Diabetes Research, Capital Hospital, Beijing. The visitors are touring various medical centers in this country as part of a medical exchange program sponsored by the U.S. State Department.*

Nonetheless, most ophthalmologists, including Dr. Sebestyen, feel that a well-designed, well-controlled, multicenter study is absolutely necessary if valid answers are to be obtained to the following questions: How high a degree of myopia is actually alleviated by the operation? Can astigmatism be corrected predictably, and can postoperative glare and dazzle be eliminated? What are the long term results and effects of the operation?

Dr. Sebestyen recently attended a meeting of the New England Ophthalmological Society where it was reported that: some of the initial improvement achieved by radial keratotomy reverses itself by the end of six months; the operation cannot affect more than three diopters of change in nearsightedness except in a few isolated cases; and postoperative glare was a significant complaint in a majority of patients who had the operation – a condition which makes night driving difficult and dangerous.

"We only have two eyes," said Dr. Sebestyen "If you undergo radial keratotomy in your early 20s because you don't want to wear glasses or contact lenses, then how can you be sure the procedure will have no adverse effect on your eyes over the next 20 years or more? The risks are too great to accept until we have more definite answers."

Warren *(continued from page 1)*

of Harvard Medical School, said, ". . . In honoring Shields Warren, the donors recognize a physician-scientist whose research on the health effects of radiation and subsequent recommendations for its safe use have had a major impact on health and environmental safety. His scholarly contribution as an investigator, his talent as a teacher, his warmth and humility as a person, and his ability to influence public policy in controlling the power of radiation, have found fitting and enduring recognition by the establishment of this professorship."

The Mallinckrodt Corporation dedicated its Pharmaceutical Research and Development Laboratories to Dr. Warren in 1978. Speaking at the dedication ceremonies, Harold E. Thayer, chairman of the board of Mallinckrodt, Inc., cited Dr. Warren's "significant medical and scientific achievements and his many contributions to the corporation as director, consultant, and counselor."

Mallinckrodt, Inc. is a 113-year-old manufacturer of health care products, specialty chemicals, food ingredients, flavors and fragrancies. The company has long been known as a supplier of high purity chemicals for pharmaceutical manufacturing. It was among the first commercial producers of barium sulphate products for x-ray diagnosis, and has made numerous contributions to the development of iodinated compounds for use as x-ray contrast media. The company is a leading manufacturer of radiopharmaceuticals for use in medical diagnosis.

Hay fever *(continued from page 1)*

jection site resembling a mosquito bite will appear, indicating an allergy to that material.

Armed with the results of skin testing, the allergist can then consider immunotherapy, perhaps the most effective long-term treatment available today. Over a period of two to five years, repeated injections of small but gradually increasing doses of the offending material desensitizes the hay fever sufferer to his allergy. Generally, only those patients with incapacitating symptoms from the allergy or from the adverse side effects of antihistamines are considered as candidates for immunotherapy.

A complication of immunotherapy, however, is that allergists cannot precisely determine how long injection therapy must continue until permanent immunity is achieved. Usually, if a person remains trouble-free for a year with a loss of skin test reactivity to the offending allergen, treatment stops.

One hope of allergists favoring immunotherapy is for the continued development of new biochemically-altered ragweed extracts that dramatically reduce injection periods. One such substance called gluteralderhyde polyemerized allergen extract has successfully established immunity in test patients within three months — instead of the usual three years — by permitting four times the normal dosage.

Apart from immunotherapy, the most exciting boon for hay fever sufferers is the recent development of cromolyn sodium. This drug blocks the release of pharmacologically active substances from the mast cell within the body, thus averting an allergic reaction. A new orally administered dose is now being tested and should greatly improve its effectiveness. It offers the promise that some day soon hay fever suffers may only have to take one pill a day without incurring the drowsy side effects of antihistamines.

Right now, however, Dr. Sheffer feels that immunotherapy offers a better, longer lasting protection. "When I first began practice one of my major aims was to treat hay fever pharmacologically rather than with shots. At this time, however, it is doubtful that any drug treatment will replace immunotherapy. My expectation is that we'll probably focus on developing more convenient techniques for providing immunologic protection for hay fever victims and move in that direction."

School of Nursing admits pilot group

Five nursing students have successfully completed a concentrated ten-week "alternative program" developed for non-traditional students, e.g., persons of an older age group, those who desire a change of career, and those with college credits or a degree who lack set goals.

The program, consisting of two nursing courses with concurrent pharmacology studies totalling 204 hours, was organized by a task force of the School of Nursing faculty staff last year. The students who completed the summer pilot program will enter the second level of their two-year studies on an equal basis with students who have chosen the "traditional route."

Before entering the program, students must finish certain basic natural and social science courses, including English composition, psychology, sociology, microbiology, two terms of anatomy and physiology, inorganic and organic chemistry, nutrition and growth and development. CLEP examinations are accepted provided the applicant has had sufficient hours in the natural and social sciences to satisfy the state board requirements. The candidate's educational background, grades achieved and other abilities as outlined in the admission

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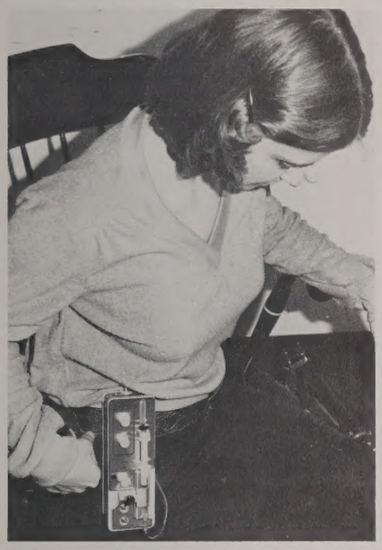
New portable insulin pump aids diabetics

Significantly healthier babies for diabetic mothers and dramatic improvement in lifestyles for other diabetics may result from two studies now underway by Deaconess staff physicians at the Joslin Clinic.

Both studies employ a new portable battery-powered insulin pump to ensure that study participants receive a steady and adjustable level of insulin between meals throughout the day. Constancy of insulin injection should provide greater control over widely fluctuating blood sugar levels, a condition common in diabetics.

A fluctuating blood sugar level, especially in the first trimester of pregnancy when major fetal organs are developing, is viewed as a probable cause of congenital deformities among infants born to diabetic mothers. Currently, women with diabetes are three to four times more likely to have children with birth defects than non-diabetic mothers. Generally, these deformities involve neural tube disorders – anything from the head to the base of the spine – ranging from cleft palate or lip to heart, kidney and respiratory defects to the absence of an organ.

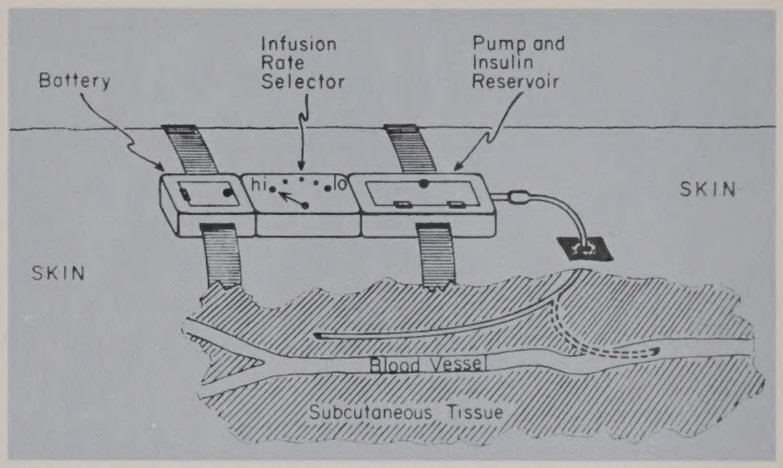


Diabetic mother-to-be wears one model of portable insulin pump.

The pump, which weighs less than two pounds, delivers its injection of insulin every eight minutes around-the-clock via a thin plastic tube implanted beneath the skin of the abdomen or legs. Patients can also adjust the pump to receive additional doses of insulin before each meal, determining the dose by measuring their blood sugar levels with a glucose meter.

Over the next two to three years, Drs. M. Donna Younger and John W. Hare of the Joslin Diabetes Foundation and Dr. John L. Kitzmiller of Brigham and Women's Hospital will test 150 diabetic women planning pregnancies. Once pregnant, the women will be admitted for a short time to either the Deaconess or Brigham and Women's to determine their insulin requirements and to learn to operate the pump.

Current expectations are that intensive management of diabetes through early use of the pump in pregnancy will reduce malformations in infants of diabetic mothers from almost ten percent to a rate approaching two percent, the level for non-diabetic mothers.



The portable insulin pump automatically administers a continuous injection of insulin.

The other study, headed by Dr. Louis Vignati of the Joslin Clinic, centers on use of the insulin pump by diabetic patients who aren't pregnant. Already, a dozen patients, ranging in age from 12 to 40, are testing the pump as a tool of treatment for their disease. During the next year a total of 50 diabetic patients will be tested on the pump at the Diabetes Treatment Unit.

According to Dr. Vignati preliminary results of the study are encouraging. So far, the pump has been generally successful in maintaining near-normal blood sugar levels and in reducing the number of insulin reactions among study participants.

"One big lifestyle advantage of the pump is that a diabetic can be late for a meal. With the old method of insulin injection by syringe they had to eat on time or else end up with low blood sugar levels and risk a reaction. Overall, I think that the pump will prove very significant in terms of improving metabolic control of diabetes while at the same time improving lifestyles."

Dynamic treatment *(continued from page 1)*

linear accelerator rotates around the patient according to instructions from a computer. The couch beneath the patient also moves in various patterns. The computer's coordination of these movements distributes radiation so that it penetrates the tumor from different angles. The computer also controls the individual collimators of the accelerator from which the radiation eminates.

JCRT staff members, assisted by MIT and Siemen engineers, devised a system which assures that signals flow to the machine and console at the required rate. The system operator has ultimate control by watching the machine and patient on closed-circuit television and the console displays of the unit's performance. The computer can turn off the radiation or keep it from being switched on by the operator if it detects a malfunction, but the radiation cannot be activated by the computer directly.

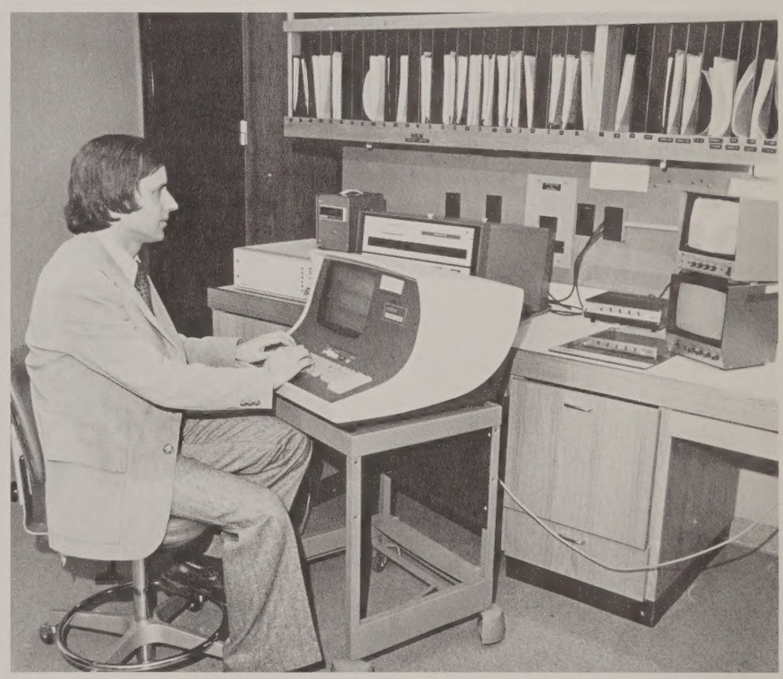
In a published report on dynamic treatment, the JCRT staff elaborated on the theory upon which the system is based: 'Cancer treatment has two components: local control achieved through total eradication of the primary tumor and regional lymph-node involvement; and the destruction of the disease in distant sites (metasases).

'It has been estimated that 100,000 treated cancers fail locally each year in the United States. Many of these cancers are advanced and, even if they could be controlled locally, one might anticipate failure due to metastases. However, recent successes in long-term adjuvant systemic chemotherapy suggests that cure may be possible if local control can be achieved.'

"Dynamic treatment gives us the potential for improved local control, but it will take several years to compile statistics to substantiate this improvement," said Dr. John T. Chaffey, director of the NEDH division of JCRT.

"Immediate benefits include greater accuracy in planning radiotherapy treatments and the ability to develop treatment plans for tumors previously considered untreatable. These complex treatment plans eventully may be transferable to other computer-controlled therapy machines with individual adjustments made to fit each patient."

Although located at the Deaconess, the system is available for use by all five Harvard-affiliated teaching hospitals which have combined therapeutic services to become the Joint Center for Radiation Therapy. Other than the Deaconess, member hospitals are Beth Israel Hospital, Faulkner Hospital, Brighams and Women's, Sidney Farber Institute and the Children's Hospital Medical Center.



Peter Kijewski, Ph.D., JCRT physicist, gives the computer instructions to indicate the sequence of machine motions for a patient currently undergoing treatment.

Pilot group *(continued from page 2)*

criteria are used to determine eligibility for the program.

"We are very fortunate to have secured a well-qualified instructor, Ann Kane, who has considerable experience in teaching adult students," said Director of Nursing Ellen Howland. "The faculty's first staff development activity for 1980-81 was a two-day workshop on the non-traditional student, giving support and credence to our continuing focus in this direction.

"In addition to recruiting our second group of students who have their science requirements fulfilled, work is underway to establish further plans to enroll licensed practical nurses for advanced placement beginning in the fall of 1981, for admission in 1982."

A/V suite opens in School of Nursing

Incoming freshmen and returning upper classmen at the School of Nursing should find their educational instruction much more stimulating this coming academic year. During summer recess finishing touches were completed on a new audio-visual (A/V) suite in the School's educational complex that will be used for nursing instruction.

The new A/V area boasts a fully-equipped professional photography darkroom and adjoining resource room complete with a battery of color and black-and-white TV cameras, video cassette decks, light stands, slide projectors and various other equipment.

The opening of the A/V facility at the School of Nursing is the result of a joint effort by the hospital and a $25,000 grant from the Helene Fuld Health Trust.

Established in 1935, the Helene Fuld Trust supports projects aimed at improving the health, education and welfare of nursing students at schools and colleges throughout the United States and abroad.

In addition to providing funds, Helene Fuld donated all of the audio-visual equipment from the Lynn Hospital School of Nursing which closed in 1979. Under an agreement with Helene Fuld this equipment will be used solely for instruction of nursing students at the Deaconess.

Ernest Cakounes, a media specialist formerly with Lynn Hospital School of Nursing, will run the new facility at NEDH's School of Nursing. He will serve as a resource person for both faculty and students in the more sophisticated use of audio-visual instructional aids.

In addition, Mr. Cakounes' services will be available to hospital departments for photography, slide and transparency production and black-and-white photo development.

Deaconess News in Brief

Director of Dietetics **Joyce Tower,** newly elected president of the Massachusetts Dietetic Association, assumed responsibilities for the one-year term at the association's annual meeting held at the Sheraton-Tara Braintree on September 17.

Dr. Daniel O'Leary, diagnostic radiology department, spoke about stroke prevention on WBZ-TV's "Prime Time" on October 5.

Virginia Agnew, a NEDH volunteer, was recently profiled in a Boston Globe column entitled "Senior Set".

Sister Claire Dumont, SSCC, has been endorsed by the United States Catholic Conference for a five-year period. Sister Claire has worked with the Deaconess pastoral care service for three years. She received a master's degree in pastoral ministry from Emmanuel College in May.

Chaplain Charles Kessler received his endorsement for hospital ministry from the United Methodist Church, Division of Chaplains. Chaplain Kessler has worked at the Deaconess from 1970-72, and from 1975 to the present.

Dr. Jacob J. Lokich, section chief in medical oncology, lectured at the Chemotherapy Foundation Symposium IV – "Optimum Strategies for Clinical Cancer Chemotherapy" – held from October 22-24 in New York City.

Dr. Lokich also recently participated in a conference on "CEA (Carcinoembryonic Antigen): Its Role as a Marker in the Management of Cancer," sponsored by the National Institutes of Health in Bethesda, Maryland. The meeting is part of a Consensus Development Series which brings together experts to take a close look at controversial medical or dental procedures, drugs or services.

Richard Griffin was recently promoted to assistant manager of pharmacy/IV therapy services. He previously worked as supervisor of IV therapy for a year.

Phyllis Wasserman, assistant director of volunteers, was one of four persons cited as an outstanding supervisor by the Action for Boston Community Development (ABCD) organization in recent ceremonies. Mrs. Wasserman supervises high school students placed at NEDH in departments such as messenger service, personnel and the library. The students are exploring health career fields. ABCD is designed to provide service for economically disadvantaged youth in Boston.

Susan Levine, renal dietitian specialist; **Karen Harvey,** research assistant, NEDH nutrition/metabolism laboratory; **Michael Blumenkrantz,** assistant professor of medicine at UCLA School of Medicine; and **Dr. George Blackburn** co-authored an article entitled "Nutritional Assessment and Treatment of Chronic Renal Failure." The article appeared in the July issue of the American Journal of Clinical Nutrition.

Marcia Stowell, education coordinator for NEDH's School of Technology, made a presentation on the use and preparation of audio-visual material for instruction of allied health personnel at the fall meeting of the Maine Association for Medical Technology.

Cynthia Schneider, R.D., diabetes dietitian specialist, recently participated as one of five telephone moderators for the American Dietetic Association's telelecture on "Modern Concepts in Diabetes," broadcast live from WGBH. The program was viewed by over 3500 dietitians across the country, who were able to phone and ask questions of the participants.

Cost containment starts fourth year of activities

The Deaconess cost containment committee capped off its third year of educational efforts with an intensive department manager visitation program conducted by Martin Cernek, cost containment committee chairman; and coordinators Mary Ann Moberly, quality assurance coordinator; Tom Wright, purchasing manager; Dino Frantegrossi; energy systems analyst; Jim Benoit, assistant to the director, and Richard Delaporta, senior staff assistant to the director.

The coordinators discussed cost containment principles and management strategies with 32 Deaconess department managers. As a result of the program the committee was able to determine a savings of approximately $477,000 among these hospital departments for fiscal year 1980.

"Not all department managers were able to report specific cost savings since all conservation activities cannot be accurately measured," said Mr. Cernek. "But we were grateful for the evidence of cooperation demonstrated by the department managers. Beyond gathering statistics and answering questions, we wanted to build a stronger network of communication between cost containment representatives in various departments and the central committee coordinators. The concept that good management and cost consciousness go hand-in-hand was very aptly demonstrated by our department managers."

The Massachusetts Hospital Association's (MHA) cost containment committee at its recent quarterly conference acknowledged the Deaconess program as an effective model. The MHA has previously utilized the Deaconess cost containment bulletin board idea among its hospital membership.

Future plans for the Deaconess cost containment committee include a suggestion box which would incorporate an incentive for employees who devise practical cost saving solutions for specific areas in the hospital.

New England Deaconess Hospital **pulse**

The New England Deaconess Hospital is a 489-bed and 14-building complex. Physicians from the Joslin Clinic, the Lahey Clinic, Overholt Thoracic Clinic and the general medical and surgical staffs serve the needs of their patients at the hospital. The Deaconess is internationally known for diagnosis, treatment and research in brain and chest surgery, cancer, diabetes and general medicine, and is affiliated with Harvard Medical School.

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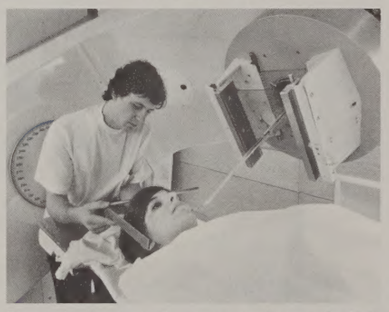

Dynamic treatment, or computer-controlled radiation therapy, is used in treating cancer patients in the Joint Center for Radiation Therapy (see page 1).

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